



GRADE 12 DIPLOMA EXAMINATION

Physics 30

June 1986

Alberta
EDUCATION

CURRICULUM

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PHYSICS 30 MULTIPLE CHOICE KEY

1	A	29	C
2	C	30	C
3	A	31	B
4	B	32	C
5	A	33	B
6	D	34	D
7	A	35	B
8	D	36	B
9	C	37	B
10	B	38	C
11	A	39	B
12	D	40	C
13	D	41	A
14	D	42	A
15	C	43	D
16	D	44	A
17	D	45	B
18	A	46	A
19	A	47	A
20	B	48	B
21	B	49	D
22	D	50	C
23	C	51	C
24	B	52	D
25	C	53	A
26	C	54	B
27	A	55	C
28	A	56	C

WORKS IN MULTIPLE CHOICE KEY

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SAMPLE ANSWERS TO THE WRITTEN-RESPONSE SECTION

Note: The responses that follow represent ONE approach to each of the problems. During the diploma examination marking session, provision is made for considering the various approaches students may have used.

Question 1 (3 marks)

$$\begin{aligned}
 \text{a. } \frac{v(\text{air})}{v(\text{liquid})} &= n(\text{liquid}) \\
 v(\text{liquid}) &= \frac{v(\text{air})}{n(\text{liquid})} \\
 &= \frac{(3.00 \times 10^8 \text{ m/s})}{1.54} \\
 &= 1.95 \times 10^8 \text{ m/s}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. Total time} &= \frac{d(\text{air})}{v(\text{air})} + \frac{d(\text{liquid})}{v(\text{liquid})} \\
 &= \frac{2(1.30 \times 10^3 \text{ m} + 1.80 \times 10^3 \text{ m})}{(3.00 \times 10^8 \text{ m/s})} + \frac{2(9.00 \times 10^2 \text{ m})}{(1.95 \times 10^8 \text{ m/s})} \\
 &= 2.99 \times 10^{-5} \text{ s}
 \end{aligned}$$

Question 2 (3 marks)

$$\text{a. } I = 5.0 \text{ A}$$

$$\text{b. } R = V/I$$

$$= (35 \text{ V})/(5.0 \text{ A})$$

$$= \underline{7.0 \Omega}$$

GRADE 12 DIPLOMA

Note: The responses that follow represent the responses of each of the students. During the grading process, the responses of the students are reviewed for content and for the use of appropriate language.

Question 1 (10 marks)

a. 100%

b. 100%

c. 100%

d. 100%

e. 100%

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Question 2 (10 marks)

a. 100%

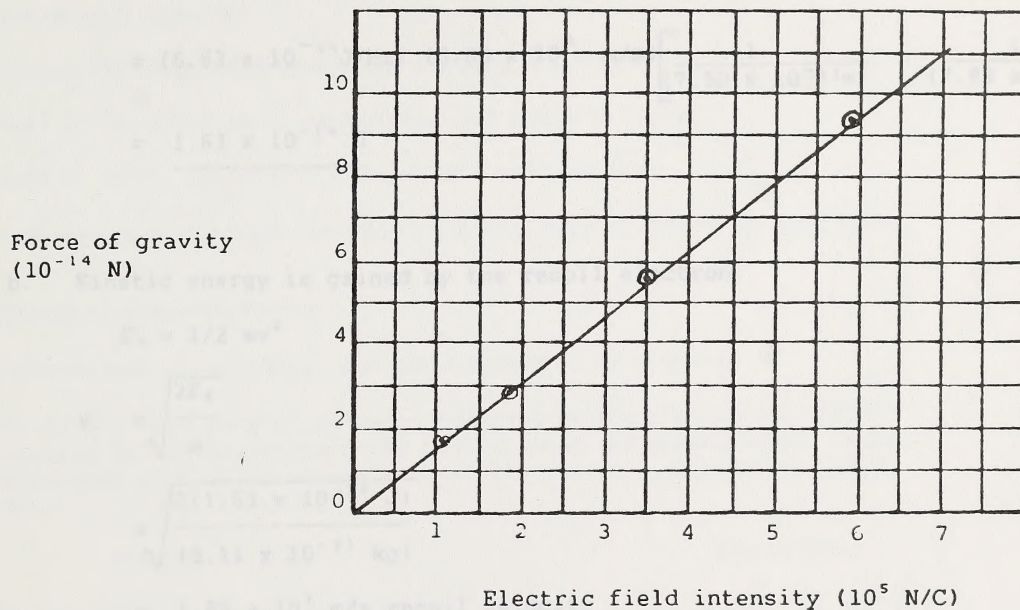
b. 100%

c. 100%

d. 100%

Question 3 (4 marks)

a.



b.

$$\begin{aligned}
 \text{slope} &= \frac{y_2 - y_1}{x_2 - x_1} \\
 &= \frac{(9.3 \times 10^{-14} - 0) \text{ N}}{(5.8 \times 10^5 - 0) \text{ N/C}} \\
 &= \underline{1.6 \times 10^{-19} \text{ C}}
 \end{aligned}$$

The slope represents one elementary charge.

GRADE 12 DIPLOMA EXAMINATION
PHYSICS 30

Question 4 (4 marks)

a. $E = (hc/\lambda) - (hc/\lambda)$

Total possible marks: 30

This is a CLASSIC question. Each question has a value of 1 mark.

$$= (6.63 \times 10^{-34} \text{ J/Hz}) (3.00 \times 10^8 \text{ m/s}) \left[\frac{1}{(7.50 \times 10^{-11} \text{ m})} - \frac{1}{(7.99 \times 10^{-11} \text{ m})} \right]$$

PART A: 50 multiple-choice questions, each with a value of 1 mark.

$$= \underline{1.63 \times 10^{-16} \text{ J}}$$

PART B: Four short-answer questions for a total of 14 marks.

A physics data sheet is provided for your reference. Approved calculators may be used.

b. Kinetic energy is gained by the recoil electron.

GENERAL INSTRUCTIONS

$$E_k = 1/2 mv^2$$

Fill in the bubbles on the answer sheet as directed by the examiner.

$$v = \sqrt{\frac{2E_k}{m}}$$

For multiple-choice questions, read each carefully and decide which of the choices MUST complete the statement or answers the question. Locate that question number on the answer sheet and mark the bubble that corresponds to your choice. USE AN HB PENCIL. ONLY ONE BUBBLE SHOULD BE MARKED.

$$= \sqrt{\frac{2(1.63 \times 10^{-16} \text{ J})}{(9.11 \times 10^{-31} \text{ kg})}}$$

Answer Sheet

$$= \underline{1.89 \times 10^7 \text{ m/s recoil velocity}}$$

This section

A. Chemistry

B. Biology

C. Physics

D. Mathematics

If you wish to change an answer, please erase your first mark completely.

For written-response questions, read each carefully, show all your calculations, and write your answer in the space provided in the examination booklet.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET

The presiding examiner will collect the answer sheet and examination booklet for transmission to Alberta Education.

JUNE 1986

Question 4 (4 marks)

a. $E = (mc^2) - (m_0c^2)$

$$= (1.62 \times 10^{-27} \text{ kg}) (3.00 \times 10^8 \text{ m/s})^2 - (1.62 \times 10^{-27} \text{ kg}) (3.00 \times 10^8 \text{ m/s})^2$$

$$= 1.62 \times 10^{-12} \text{ J}$$

b. Kinetic energy is gained by the recoil electron.

$$E_k = 1.62 \text{ eV}$$

$$E_k = \frac{1}{2}mv^2$$

$$v = \sqrt{\frac{2E_k}{m}} = \sqrt{\frac{2(1.62 \times 10^{-19} \text{ J})}{(9.11 \times 10^{-31} \text{ kg})}}$$

$$= 1.89 \times 10^6 \text{ m/s (recoil velocity)}$$

**GRADE 12 DIPLOMA EXAMINATION
PHYSICS 30**

DESCRIPTION

Time: 2½ hours

Total possible marks: 70

This is a **CLOSED-BOOK** examination consisting of two parts:

PART A: 56 multiple-choice questions each with a value of 1 mark.

PART B: Four written-response questions for a total of 14 marks.

A physics data booklet is provided for your reference. Approved calculators may be used.

GENERAL INSTRUCTIONS

Fill in the information on the answer sheet as directed by the examiner.

For multiple-choice questions, read each carefully and decide which of the choices **BEST** completes the statement or answers the question. Locate that question number on the answer sheet and fill in the space that corresponds to your choice. **USE AN HB PENCIL ONLY.**

Example

This examination is for the subject area of

- A.** Chemistry
- B.** Biology
- C.** Physics
- D.** Mathematics

Answer Sheet

A	B	C	D
①	②	●	④

If you wish to change an answer, please erase your first mark completely.

For written-response questions, read each carefully, show all your calculations, and write your answer in the space provided in the examination booklet.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET

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PART A

INSTRUCTIONS

There are 56 multiple-choice questions with a value of one mark each in this section of the examination. Use the separate answer sheet provided and follow the specific instructions given.

<p>NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.</p>

WHEN YOU HAVE COMPLETED PART A, PROCEED DIRECTLY TO PART B

DO NOT TURN THE PAGE TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER.

1. Which scientist's observations of Jupiter's moons led to a calculation of a finite speed for light?
 - A. Römer
 - B. Galileo
 - C. Newton
 - D. Huygens

2. The speed of light in a medium with an index of refraction of 1.5 is
 - A. 4.5×10^8 m/s
 - B. 3.0×10^8 m/s
 - C. 2.0×10^8 m/s
 - D. 1.5×10^8 m/s

3. A student measures the shadow of a building and finds it to be 10.5 m long. The student then measures the shadow of a vertical metre stick and finds it to be 1.25 m long. The height of the building is
 - A. 8.40 m
 - B. 9.25 m
 - C. 9.50 m
 - D. 13.1 m

4. The refractive indices of water and glass are 1.33 and 1.52 respectively. If the angle of incidence is 40.0° for light travelling from water into glass, the angle of refraction is
 - A. 47.3°
 - B. 34.2°
 - C. 28.9°
 - D. 25.0°

5. A grating that has 5.0×10^3 slits/cm produces a first-order line 0.21 m below the centre line on a screen located 1.0 m from the grating. The wavelength of the light used is
 - A. 4.0×10^{-7} m
 - B. 2.0×10^{-5} m
 - C. 2.0×10^{-4} m
 - D. 1.0×10^{-2} m

6. A rocket travelling away from Earth at a speed of 520 km/s emits an intense pulse of light every 24 hours exactly. After six days, astronomers on Earth observe that a pulse is delayed by approximately
- A. 1 s
 - B. 5 s
 - C. 150 s
 - D. 900 s
7. A ray of light passing through water at a speed of 2.26×10^8 m/s enters a piece of glass at an angle of incidence of 42.0° and slows to a speed of 2.00×10^8 m/s. The angle of refraction is
- A. 36.3°
 - B. 37.2°
 - C. 47.4°
 - D. 49.1°

Use the following information to answer question 8.

These relationships may apply to reflection or refraction:

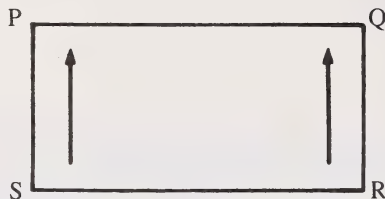
- I $\theta_i = \theta_r$
- II $\sin \theta_i = \sin \theta_r$
- III $\lambda_i = \lambda_r$
- IV $v_i = v_r$

8. What relationship(s) apply to the reflection of a wave from a plane glass surface?
- A. I only
 - B. I and II only
 - C. I, III and IV only
 - D. I, II, III, and IV
-
9. One of the observations of a double-slit experiment is an interference pattern in which the distance from the central maximum to the first-order image is X. If the wavelength of the light and the slit separation were both doubled, what would be the distance between the central maximum and the first-order image?
- A. 4X
 - B. 2X
 - C. X
 - D. X/4

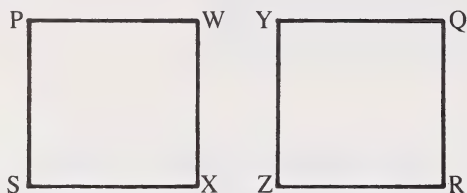
10. The period of vibration of a light wave is 2.0×10^{-15} s. Its wavelength is
- A. 1.5×10^{-9} m
 - B. 6.0×10^{-7} m
 - C. 6.0×10^3 m
 - D. 1.5×10^5 m
11. Under white light, three cards appear white, red, and green respectively. Under monochromatic red light, the cards will appear
- A. red, red, and black respectively
 - B. red, red, and orange respectively
 - C. black, red, and black respectively
 - D. red, black, and black respectively
12. For two light waves to interfere constructively, they must
- A. be $\frac{1}{2}\lambda$ out of phase and have the same amplitude
 - B. be in phase and have the same amplitude
 - C. be $\frac{1}{2}\lambda$ out of phase
 - D. be in phase

Use the following information to answer question 13.

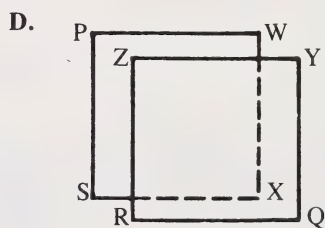
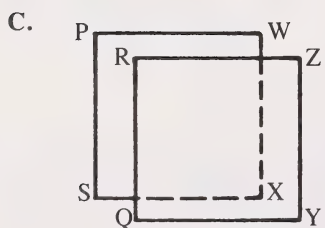
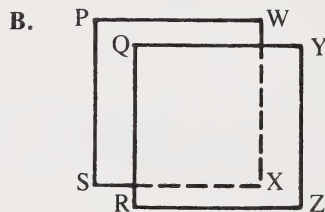
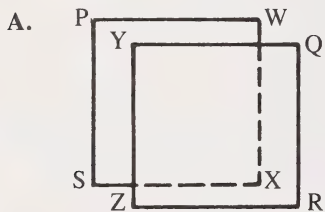
The rectangle represents a sheet of polarizing filter.



The filter is cut as shown.



13. If the minimum amount of light is to pass through the overlapping area, the filters could be arranged



14. The wave theory of light can account for all of the following EXCEPT
- A. reflection
 - B. refraction
 - C. polarization
 - D. photoelectric effect
15. A ray of white light is projected through a polaroid filter. The emerging ray
- A. remains unchanged
 - B. becomes monochromatic
 - C. has an electric field in one plane only
 - D. cannot pass through a second polaroid filter
16. The wave theory of light is REQUIRED to explain
- A. the Compton effect
 - B. reflection in a mirror
 - C. the photoelectric effect
 - D. interference and diffraction of light
17. A negatively-charged rod is brought near an uncharged piece of paper. A force of attraction results because the
- A. paper gains protons
 - B. paper loses electrons
 - C. protons rearrange themselves
 - D. electrons rearrange themselves
18. Of the following, the only vector field is
- A. gravity
 - B. temperature
 - C. air pressure
 - D. light intensity

19. If an ion has 13 protons, 14 neutrons, and 10 electrons, the character and magnitude of its charge is

A. $4.8 \times 10^{-19} \text{ C}$
B. $1.6 \times 10^{-19} \text{ C}$
C. $-1.6 \times 10^{-19} \text{ C}$
D. $-4.8 \times 10^{-19} \text{ C}$

20. Which diagram would represent the electric field surrounding a positive charge?

A.



B.



C.



D.

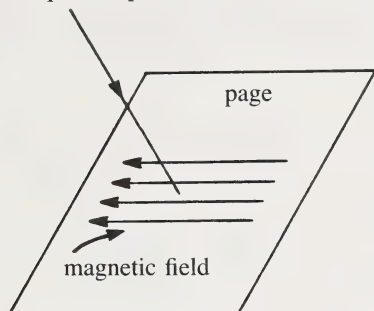


21. Two charges, each of $4.0 \times 10^{-7} \text{ C}$, repel each other with a force of $1.6 \times 10^{-4} \text{ N}$. The charges are separated by a distance of
- A. 1.0 m
B. 3.0 m
C. 4.0 m
D. 9.0 m

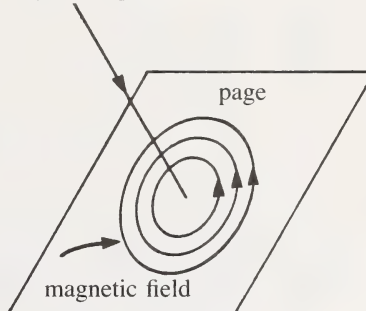
22. A particle is moving in a field. The force acting on it will be in the SAME direction as the field if the particle is
- A. negatively charged and moves in a magnetic field
B. positively charged and moves in a magnetic field
C. negatively charged and placed in an electric field
D. positively charged and placed in an electric field

23. If a proton were fired into the centre of a page, which diagram would represent the appearance of its magnetic field?

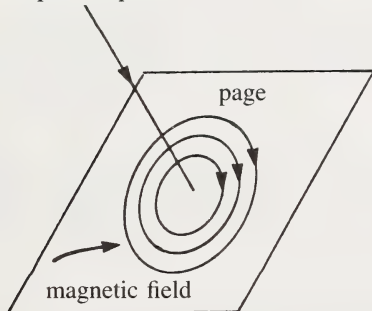
A. path of proton



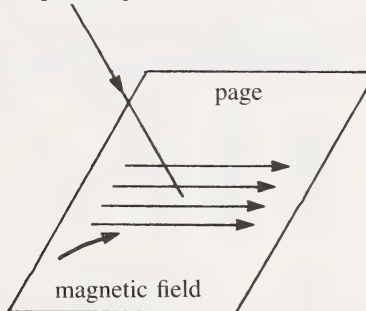
B. path of proton



C. path of proton



D. path of proton



24. The electrostatic force of attraction between an electron and a proton that are 1.0×10^{-10} m apart is

- A. 1.0×10^{-48} N
- B. 2.3×10^{-8} N
- C. 9.0×10^9 N
- D. 9.0×10^{29} N

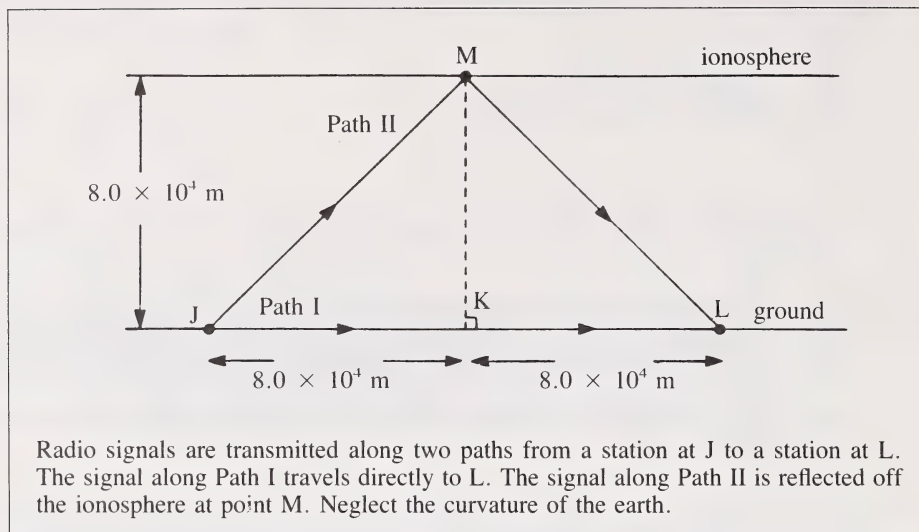
25. An electric field of 4.0×10^6 N/C causes two charged objects, each of mass 2.0×10^{-9} kg, to accelerate in the same direction. If the acceleration of the first object is 3.2×10^{-3} m/s² and the acceleration of the second object is 6.4×10^{-4} m/s², their charges differ by

- A. $12e$
- B. $10e$
- C. $8e$
- D. $2e$

26. A proton is accelerated to a speed of 2.0×10^6 m/s by a strong electric field. The proton is then stopped in 4.0×10^{-3} s. Assuming uniform deceleration, the stopping force exerted on the proton is
- A. 1.4×10^{-23} N
 - B. 3.4×10^{-21} N
 - C. 8.4×10^{-19} N
 - D. 3.4×10^{-15} N
27. What happens when a charge moves?
- A. A magnetic field is created.
 - B. The electric field loses energy.
 - C. An opposite charge must also move.
 - D. A like charge must be made to come to rest.
28. An electric heater draws 8.0 A when plugged into a 120 V outlet. The heat energy generated by the heater in 1.5 h is
- A. 5.2×10^6 J
 - B. 8.6×10^4 J
 - C. 4.3×10^4 J
 - D. 1.4×10^3 J
29. Particles in the Van Allen radiation belts have been trapped there by
- A. an energy field
 - B. an electric field
 - C. a magnetic field
 - D. a gravitational field
30. A charged particle projected perpendicularly into a uniform magnetic field will travel in a circle. If the strength of the magnetic field were doubled, the speed of projection tripled, and the charge on the particle halved, the radius of its curved path would become
- A. half as much
 - B. twice as much
 - C. three times as much
 - D. six times as much

31. A constant electric current in a conductor produces a magnetic field that
- A. is zero
 - B. circles the conductor
 - C. is parallel to the conductor
 - D. radiates out from the conductor
32. Which statement defines the Law of Conservation of Electric Charge for a closed system?
- A. The amount of electric charge remains constant only if no reactions occur.
 - B. The number of electrons and protons remains constant only if no reactions occur.
 - C. The net amount of electric charge remains constant regardless of what reactions occur.
 - D. The total number of charged objects remains constant regardless of what reactions occur.
33. The wavelength of an electromagnetic wave produced by an alternating electric current is increased by
- A. increasing the current's frequency
 - B. decreasing the current's frequency
 - C. increasing the current's magnitude
 - D. decreasing the current's magnitude
34. Hertz used an apparatus consisting solely of a loop of wire with a small gap between its ends to
- A. create circular magnetic fields
 - B. detect circular magnetic fields
 - C. create electromagnetic radiation
 - D. detect electromagnetic radiation

Use the following information to answer question 35.



35. The time delay between the two signals is
- $1.1 \times 10^{-4} \text{ s}$
 - $2.2 \times 10^{-4} \text{ s}$
 - $5.3 \times 10^{-4} \text{ s}$
 - $7.5 \times 10^{-4} \text{ s}$
-
36. All of the following are electromagnetic waves EXCEPT
- X-rays
 - cathode rays
 - infra-red radiation
 - ultraviolet radiation
37. Experimental evidence shows that electromagnetic waves produced by an induction coil
- propagate at varying speeds
 - can travel in a vacuum
 - are longitudinal waves
 - resist being reflected

38. A spaceship travels at a speed of 2×10^8 m/s. As it leaves a planet, it sends radio signals. The speed of the radio waves as measured by a receiving station on the planet will be
- A. 1×10^8 m/s
 - B. 2×10^8 m/s
 - C. 3×10^8 m/s
 - D. 5×10^8 m/s
39. Electromagnetic radiation of wavelength 1.5×10^{-3} m is classified as
- A. an X-ray
 - B. a microwave
 - C. a gamma ray
 - D. a broadcast radio wave
40. The atomic mass of iron is 55.8 and the atomic mass of oxygen is 16.0. When 57.9 g of magnetic Fe_3O_4 are reduced to iron and oxygen gas, the mass of oxygen gas released is
- A. 32.0 g
 - B. 30.0 g
 - C. 16.0 g
 - D. 8.00 g
41. The mass of an element produced by electrolysis is
- A. directly proportional to the product of the current and the time
 - B. inversely proportional to the current divided by the time
 - C. directly proportional to the valence of the element
 - D. inversely proportional to the rate of current flow
42. Cathode rays can be deflected by
- A. electric or magnetic fields
 - B. magnetic fields only
 - C. ultraviolet radiation
 - D. electric fields only
43. What is the charge-to-mass ratio of a particle travelling at 2.29×10^6 m/s perpendicularly to a magnetic field of intensity 0.200 T if its circular path has a radius of 12.0 cm?
- A. 5.50×10^4 C/kg
 - B. 1.37×10^6 C/kg
 - C. 3.82×10^6 C/kg
 - D. 9.54×10^7 C/kg

44. An unknown EM radiation penetrates the Earth's atmosphere. It is observed that the radiation easily penetrates solid objects. There is a corresponding increase in the incidence of genetic disorders. This radiation would most likely be
- A. X-ray radiation
 - B. infra-red radiation
 - C. ultraviolet radiation
 - D. microwave radiation
45. If the second energy level of a hydrogen-like atom is -32 eV , then the fourth energy level is
- A. -16 eV
 - B. -8.0 eV
 - C. -4.0 eV
 - D. -2.0 eV
46. The Franck-Hertz experiment provided evidence for the
- A. discrete energy levels within an atom
 - B. concentration of mass in the nucleus of an atom
 - C. concentration of positive charge in the nucleus of an atom
 - D. relationship of chemical activity to the structure of an atom
47. A small particle moves horizontally at $2.0 \times 10^6 \text{ m/s}$ and enters a downward electric field produced by two horizontal plates $5.0 \times 10^{-3} \text{ m}$ apart and connected to a $1.00 \times 10^2 \text{ V}$ battery. If the particle has $q/m = 1.0 \times 10^8 \text{ C/kg}$, the instantaneous acceleration is
- A. $2.0 \times 10^{12} \text{ m/s}^2$
 - B. $3.0 \times 10^8 \text{ m/s}^2$
 - C. $1.0 \times 10^6 \text{ m/s}^2$
 - D. $4.0 \times 10^{-1} \text{ m/s}^2$
48. The FALSE statement regarding cathode rays is that
- A. cathode rays can be accelerated by electric and gravitational fields
 - B. magnetic fields similarly affect visible light beams and cathode rays
 - C. some chemical reactions are similarly affected by cathode rays and by visible light beams
 - D. the nature of the cathode material does not affect the charges or the masses of the rays emitted

49. A beam of charged particles moves undeflected through a region of perpendicular electric and magnetic fields. The magnetic field is 2.0×10^{-3} T. The electric field is produced by two parallel plates 3.0 cm apart with a potential difference of 3.0×10^2 V. The speed of the particles is
- A. 4.5×10^3 m/s
 - B. 7.0×10^4 m/s
 - C. 2.5×10^5 m/s
 - D. 5.0×10^6 m/s
50. The speed at which an object must travel to have a relativistic mass that is 2.0% greater than its rest mass is
- A. $0.020c$
 - B. $0.14c$
 - C. $0.20c$
 - D. $0.90c$
51. The energy required to accelerate an electron from rest to a speed of $0.80c$ is
- A. 1.4×10^{-13} J
 - B. 8.2×10^{-14} J
 - C. 5.5×10^{-14} J
 - D. 2.6×10^{-14} J
52. A discus of 0.50 kg mass that moves at a speed of 50.0 m/s would have a de Broglie wavelength of
- A. 3.2×10^{27} m
 - B. 3.2×10^{-28} m
 - C. 1.3×10^{-33} m
 - D. 2.7×10^{-35} m
53. The wave properties of electrons in an atom were defined mathematically by
- A. Schrödinger
 - B. Compton
 - C. Einstein
 - D. Planck

54. If a particle with a rest mass of 6.67×10^{-27} kg travels at 1.8×10^8 m/s, its relativistic mass would be
- A. 1.1×10^{-26} kg
 - B. 8.3×10^{-27} kg
 - C. 4.0×10^{-27} kg
 - D. 2.4×10^{-27} kg
55. Louis de Broglie is associated with the
- A. uncertainty principle
 - B. momentum of photons
 - C. wave character of particles
 - D. explanation of the photoelectric effect
56. The idea that it is impossible to measure simultaneously both the position and velocity of an electron to unlimited accuracy was proposed by
- A. Compton
 - B. de Broglie
 - C. Heisenberg
 - D. Schrödinger

**YOU HAVE NOW COMPLETED THE MULTIPLE-CHOICE SECTION OF
THE EXAMINATION. PLEASE PROCEED TO THE NEXT PAGE AND
ANSWER THE WRITTEN-RESPONSE QUESTIONS IN PART B.**

PART B

INSTRUCTIONS

Please write your answers in the examination booklet as neatly as possible.

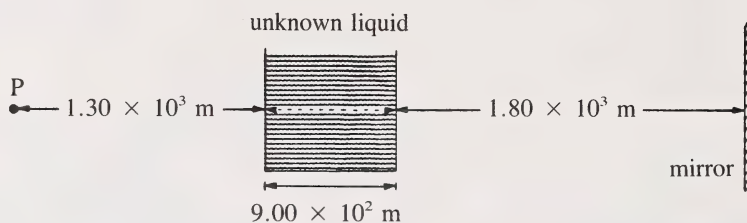
Marks will be awarded for pertinent explanations, calculations, formulas, and answers. Answers must be given to the appropriate number of significant digits.

<p>NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.</p>

TOTAL MARKS: 14

START PART B IMMEDIATELY

Use the following information to answer question 1.

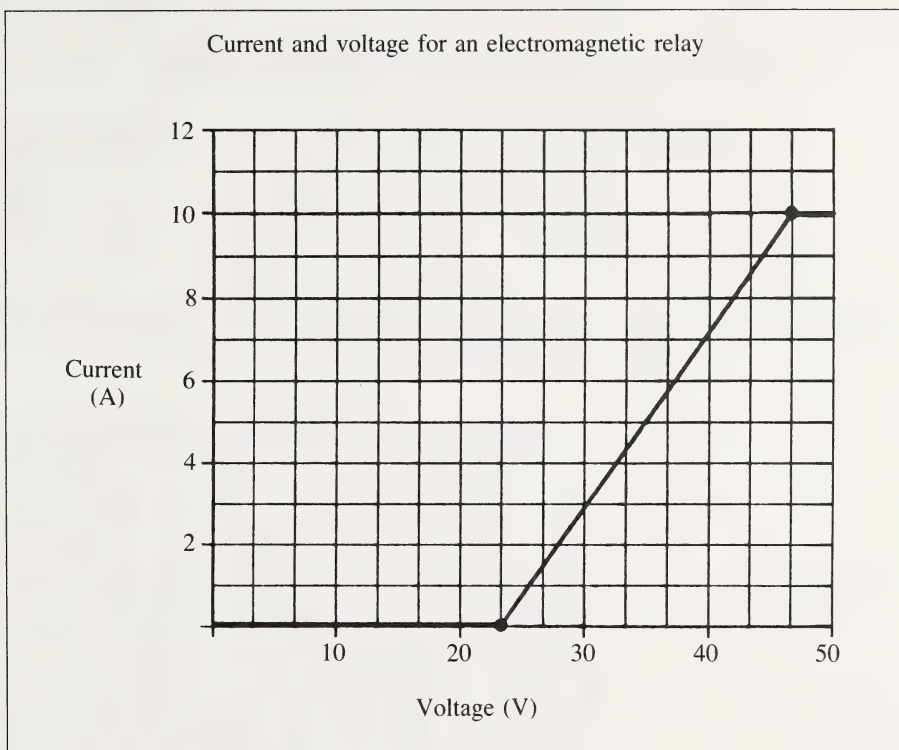


A microwave with a wavelength of $2.40 \times 10^{-2} \text{ m}$ in air is emitted from P, travels through the unknown liquid to the mirror, where it is reflected, and returns through the liquid to P. The index of refraction of the liquid is 1.54.

(1 mark) 1. a. Determine the speed of the microwave in the liquid.

(2 marks) b. Calculate the total time for the microwave to travel from P to the mirror and back again. (Note: If you could not calculate the speed of the microwave in the liquid, use a value of $1.99 \times 10^8 \text{ m/s}$.)

Use the following information to answer question 2.



(1 mark) 2. a. Determine the current when the voltage is 35 V.

(2 marks) b. Determine the resistance when the voltage is 35 V.

Use the following information to answer question 3.

In a Millikan-type experiment, the weights of four different oil drops and the field intensities required to suspend each drop are recorded.

Electric Field Intensity (N/C)

Weight of Oil Drop (N)

$$1.06 \times 10^5$$

$$1.7 \times 10^{-14}$$

$$1.80 \times 10^5$$

$$2.9 \times 10^{-14}$$

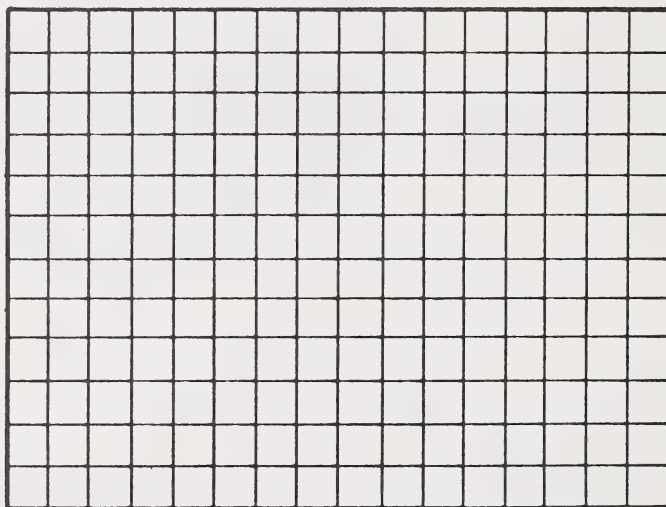
$$3.50 \times 10^5$$

$$5.6 \times 10^{-14}$$

$$5.80 \times 10^5$$

$$9.3 \times 10^{-14}$$

- (2 marks) 3. a. Plot a graph of the force of gravity versus the electric field intensity. Be sure to label the axes.



- (2 marks) b. Determine the slope of the line in the graph. What does the slope represent?

4. A 7.50×10^{-11} m wavelength X-ray is incident perpendicular to a metal mirror. The reflected X-ray has a wavelength of 7.99×10^{-11} m.

(2 marks)

- a. Calculate the loss of energy of a photon of the incident X-ray.

(2 marks)

- b. Calculate the nonrelativistic velocity of the recoil electron. (Note: If you could not calculate the energy loss, use a value of 1.66×10^{-16} J).

YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME, YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

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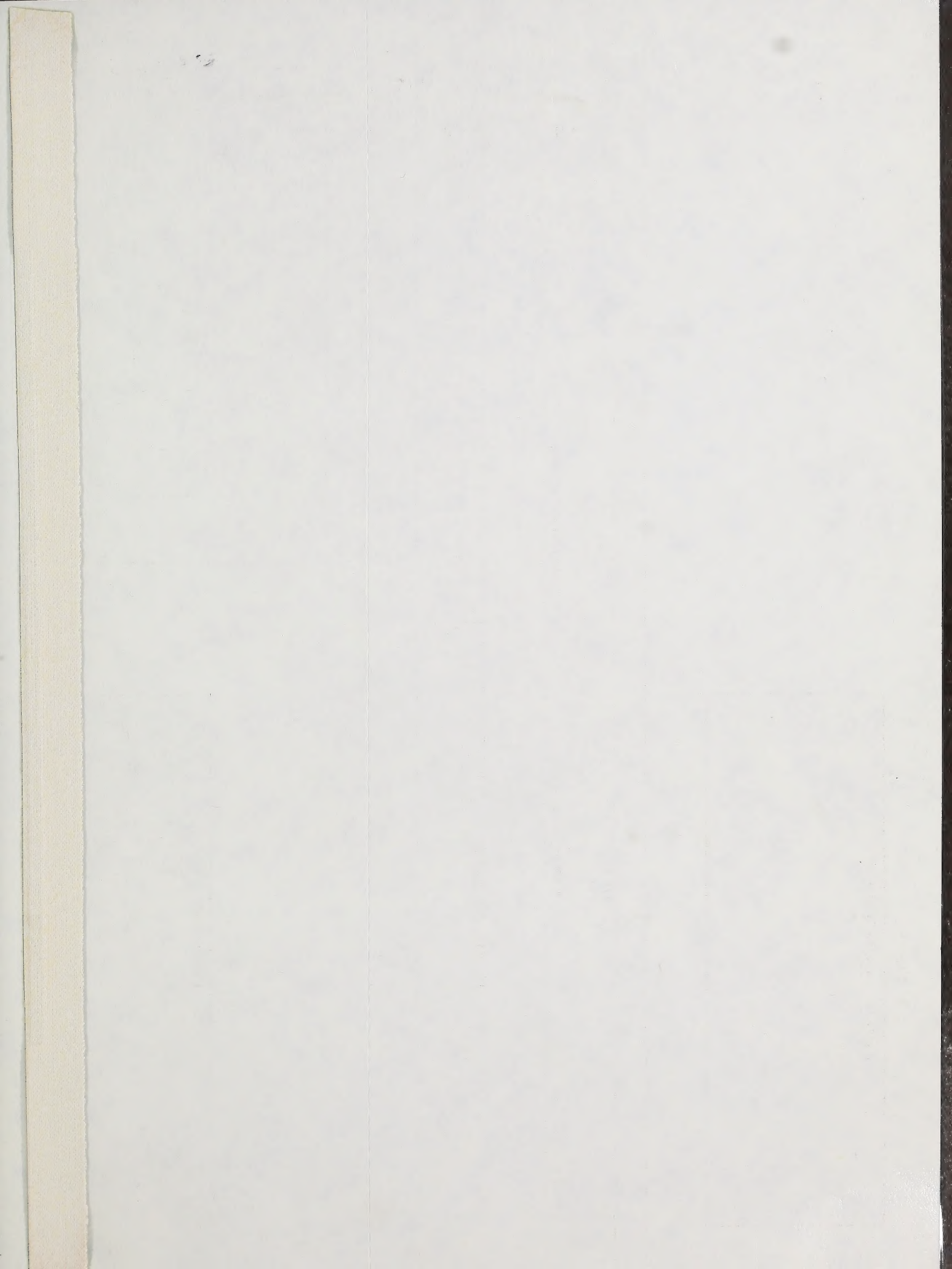
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M2

M3

M4

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PHYSICS 30

(LAST NAME)

NAME:

(FIRST NAME)

DATE OF BIRTH:

Y

M

D

SEX:

PERMANENT MAILING ADDRESS:

(Apt./Street/Ave./P.O. Box)

(Village/Town/City)

(Postal Code)

SCHOOL CODE:

SCHOOL:

SIGNATURE:

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PHYSICS 30